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Docket No.: 503.38097CX1

REMARKS

Reconsideration and allowance of the above-identified application, as currently amended, is respectfully requested:

By the above-made amendments, previously pending claims 1-8 were canceled in favor of substitute claims 9-24. The newly presented claims are likewise directed to a semiconductor device, although with some modification as to details thereof, including in a manner to further highlight various originally disclosed featured aspects. It is submitted, the invention as now set forth in newly presented independent claim 9 and as further limited in the corresponding dependent claims thereof was neither disclosed nor would have been rendered obvious even over the combination of applied art as that applied in the rejections of the outstanding Office Action.

Insofar as the previously standing rejections are concerned, they have been rendered moot with the canceling of claims 1-8. It is submitted, however, agreeing to the canceling of the rejected claims should not be construed as acquiescence with regard to the merits of such rejections. In this regard, Applicants would like to note that the canceling of claims 1-8 was made without prejudice or disclaimer of the subject matter therein:

The invention according to claim 9 is a semiconductor device which comprises:

A semiconductor device comprising:
a semiconductor substrate;
a first electrode provided on a front plane of said semiconductor substrate, said first electrode containing an Al layer as a main component;
a second electrode provided on a rear plane of said semiconductor substrate;
a first metallic member disposed over said first electrode, said first metallic member being electrically connected to said first electrode;
a second metallic member disposed under said second electrode, said second metallic member being electrically connected to said second electrode; and

Docket No.: 503.38097CX1

wherein a plurality of Au bumps are disposed between said first electrode and said first metallic member,

wherein said first electrode, said Au bumps and said first metallic member are electrically connected;

wherein said first metallic member is plated with a precious metal film, and

wherein said front plane of said semiconductor substrate and each of said Au bumps are connected via an Au Al alloy layer.

An example of such a semiconductor device, although not limited thereto, can be seen with regard to Fig. 25 of the drawings and from Sketch A which shows a relationship of the example embodiment in Fig. 25 of the drawings to the claim language, regarding the component elements thereof. According to the invention as defined in claim 9, for example, among the set-forth featured aspects thereof, the gold (Au) bumps (i.e., 461 in Fig. 25) are bonded on an aluminum electrode layer (an Al layer is a main component of the first electrode according to claim 9) and the Al disposed on a connecting portion is made of an AuAl alloy layer, which leads to improvement in the connecting strength. Moreover, the lead of the semiconductor device or the "first metallic member" of the invention is coated (plated) with a precious metal film and, further, the Au bumps and this precious metal plating (coating) layer can therefore be connected at a low temperature. An example discussion regarding such characteristic aspects is given on page 56, lines 7-24, of the Specification. The invention according to claim 9 which sets forth such featured aspects, it is submitted, could not have been realizable even in view of the combined teachings of the art documents which were applied in the previously standing rejections.

Sharma, et al. (U.S. Patent 4,927,505) discloses an interconnect metallization scheme for a semiconductor device. Regarding the manufacturing scheme associated with the illustrated embodiment in Fig. 1E, etc., in Sharma et al., there is

Docket No.: 503.38097CX1

shown Au layer 17, Au bump 20, titanium-tungsten (TiW) layer 16 and titanium-tungsten-nitride (TiWN) layer 14. In this embodiment, however, the TiW layer 16 and TiWN layer 14 are interposed between the Al layer 11, which acts as a bonding pad, and the Au layer 17. Such arrangement in which the TiW layer 16 and TiWN layer 14 are formed inbetween aluminum layer 11 and the gold layer 17 prevents any reaction from taking place between the Au and Al. Such, it is submitted, is clearly contrary to a structure as that now defined in independent claim 9 and, also, according to the corresponding dependent claims thereof. That is, consistent with Sharma et al.'s teachings, a gold-aluminum (AuAl) alloy layer cannot be realized in a device from a structure according to Sharma et al.'s metallization scheme.

If one of ordinary skill would have attempted to apply a bump electrode metallization construction according to Sharma in a device such as shown in Fig. 4B of Kasem, et al. (U.S. Patent 6,249,041), a construction as that presently set forth in independent claim 9 and, therefore, also according to the corresponding dependent claims thereof could not have been realizable. And, therefore, it is submitted, it would have been practically impossible to improve the connecting strength such as is effected with regard to the bonding portions of the present invention. Regarding Kasem et al.'s MOSFET package construction scheme, discussion thereof is found with regard to the previously submitted Amendment dated March 20, 2006 (see pages 7-8 for example, which is incorporated herein for purposes of this response). As described, for example, on page 56, line 7 et seq., of the Specification, "the strength at the bonding portions of the Al electrode/Au bump electrode lead can be increased by making all of the Al under the bonding portions of the transistor package an alloy...." Also, since the lead (or first metallic member) according to the present invention is coated with a precious metal (e.g., Pd), both the Au bumps and

Docket No.: 503.38097CX1

the precious metal coating layer can become bonded with a decreased temperature which leads to improvement in the reliability of the formed transistor, which may be a MOSFET, although not limited thereto. Such, it is submitted, could not have been achievable even over the combined teachings of Kasem, et al. and Sharma, et al.

Berndlmaier, et al. (U.S. Patent 5,053,851) discloses a structure for bonding a conductive pad on a semiconductor substrate. Berndlmaier, et al. discloses a scheme in which an embodiment such as Fig. 3 thereof is constructed with gold (Au) 44, copper (Cu) 42, chromium (Cr) 38, aluminum (Al) bump 36, chromium (Cr) 34 and aluminum/copper 12 (pad). It is observed, also, that according to Berndlmaier, et al.'s technique, a gold-aluminum (AuAl) alloy layer is not obtainable, in clear counterdistinction with that according to claim 9 and, therefore, also according to the corresponding dependent claims thereof. It is submitted, also, even if one of ordinary skill would have had the benefit of knowledge of the disclosures/teachings of the above-discussed art documents including, also, Brady, et al., which was cited in connection with a now canceled claim, the invention as that now set forth and discussed hereinabove still could not have been realizable therefrom. Therefore, for at least the above reasons, the invention according to new independent claim 9 and further according to the corresponding dependent claims thereof could not have been rendered obvious. Insofar as applicable to the currently pending claims, the previously standing art rejections are traversed and reconsideration and withdrawal of the same is respectfully requested.

Therefore, in view of the above-made amendments together with these accompanying Remarks, favorable action on the present application, as currently amended, is respectfully requested.

Docket No.: 503.38097CX1

If the Examiner deems that questions and/or issues still remain which would prevent the present application from being allowed at the present time, he is urgently invited to telephone the undersigned representative, at the number indicated below, so that either a telephone or personal interview may be arranged at the Examiner's convenience in order to discuss the same and hopefully resolve any remaining questions/issues present.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus, LLP Deposit Account No. 01-2135 (Docket No. 503.38097CX1), and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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SKETCH A